Docket No. 2003-054-TAP

TAPE LEADER MEANS FOR PULLING TAPE FROM A REEL

BACKGROUND OF THE INVENTION

1. Field of the Invention:

The present invention relates generally to data storage devices and particularly to an improved tape leader apparatus for pulling tape from a reel.

2. Background of the Invention:

Magnetic tape is frequently used to store digital data. Such tape may be housed in a tape cartridge that protects the tape from damage. Prior to use, the tape from a tape cartridge, which is the supply reel, must be connected to an empty drive reel which will act as a take-up reel. The tape may then be transferred from the supply, or cartridge, reel to the drive reel during use. In order to transfer tape from the supply reel to the drive reel, there must be a mechanism for attaching the tape from the cartridge reel to the empty drive reel.

There are currently two commonly used methods for coupling the tape from the cartridge reel to the drive reel. One method is to use a tape leader block. A leader block is attached to a free end of the tape and is used to withdraw the tape from the cartridge for read/write operations. A threading mechanism, such as a threading or loading post or arm, grabs the leader block and pulls it from the cartridge. The threading mechanism then pulls the leader block through the tape path which includes a series of guide posts or bearings, across a

longitudinal read/write head, and into a slot in a take-up reel.

The leader block and take-up reel are precisely manufactured so that when the leader block is inserted into the slot in the take-up reel, the slot is sufficiently closed by an end of the leader block to create a relatively smooth surface on the hub of the take-up reel. Ideally, the leader block should cover the slot such that the interface between the end of the leader block and the hub is perfectly smooth. Such a perfectly smooth interface, however, is not practical to manufacture. Therefore, small discontinuities between the leader block and the hub are always present. Such discontinuities can cause impressions in the first wraps of the tape around the hub. These impressions may affect the ability to retrieve data stored on the tape, which results in data errors. To ensure data integrity, a known practice involves not writing data to the portions of the tape having impressions. For example, if the first 100 wraps of the tape are typically affected by tape impressions, then no data is stored on the first 100 wraps of the tape. Such a practice, however, results in wasted data storage capability and wasted time. When the tape path is long with many turns and tight spaces as is typical in many modern tape drives, the threading mechanism required for the tape leader block method would be very complicated and costly.

A second method for threading the tape from the cartridge reel to the drive reel is to use a two-leader method, one tape leader on the cartridge reel and one

tape leader on the drive reel. The drive then connects the two leaders and winds them onto the drive reel. The tape is then pulled by the connected leaders from the cartridge reel onto the drive reel. A first tape leader is formed at the free end of the tape, which is on the cartridge reel. A second tape leader is connected to the drive reel. According to one prior art method disclosed by United States Patent 4,572,460, the first tape leader has an enlarged flat tab supported by a stem portion. The tab is flat in the same plane as the tape and is flush with the tape. The second tape leader has a locking aperture at one end through which the enlarged tab can pass or be pushed.

This prior art method does not reliably make the connection coupling the two leaders together. Further, the connection between the leaders, once made, is not very strong and may result in the leaders disconnecting improperly during use.

Therefore, the current technology would be improved by providing an improved tape leader apparatus for pulling tape from a reel.

SUMMARY OF THE INVENTION

An improved two-leader apparatus is disclosed for threading tape from a first reel to a second reel. The two-leader means includes a first reel for receiving tape from a second reel. A first leader is coupled to the first reel. A second leader is coupled to a free end of the tape which is wound around the second reel. A button is coupled to a first end of the first leader. The button protrudes from a first surface of the first leader prior to the two leaders being coupled together. The second leader includes an aperture for accepting the button.

The above as well as additional objectives, features, and advantages of the present invention will become apparent in the following detailed written description.

BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

Figure 1 is a perspective view of a drive leader including a protruding button in accordance with the present invention;

Figure 2 is a side view of the drive leader of **Figure 1** in accordance with the present invention;

Figure 3 is a top view of the drive leader of **Figure 1** in accordance with the present invention;

Figure 4 is top view of a cartridge leader in accordance with the present invention;

Figure 5 is a perspective view of the cartridge leader of **Figure 4** in accordance with the present invention;

Figure 6 is a perspective view of the drive leader of **Figure 1** and the cartridge leader of **Figure 4** coupled together in accordance with the present invention;

Figure 7 is a sectional view of the drive leader of **Figure 1** and the cartridge leader of **Figure 4** coupled together and wound on a hub that has no recess in accordance with the present invention;

Figure 8 is a sectional view of the drive leader of **Figure 1** and the cartridge leader of **Figure 4** coupled together and wound on a hub that has a recess for receiving a protruding button in accordance with the present invention; and

Figure 9 is a perspective view of the hub of **Figure 8** that has a recess for receiving a protruding button in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the present invention and its advantages are better understood by referring to the figures, like numerals being used for like and corresponding parts of the accompanying figures.

Figure 1 is a perspective view of a drive leader **100** including a protruding button **102** in accordance with the present invention. **Figure 2** is side view of the drive leader of **Figure 1** in accordance with the present invention. **Figure 3** is a top view of the drive leader of **Figure 1** in accordance with the present invention.

Referring to **Figures 1-3**, button **102** sits atop a base **104** creating a gap **106** between a first surface **108** of leader **100** and a bottom **110** of button **102**. Button **102** and base **104** together are generally mushroom shaped. Drive leader **100** includes a first portion **112** and a second portion **114**. First portion **112** has a first end **116** and a second end **118**. Drive leader **100** is attached to a drive reel (not shown). First end **116** of first portion **112** is attached to the drive reel. Second portion **114** has a first end **120** and a second end **122**. Button **102** is attached to and protrudes from second end **122** of second portion **114**.

Second portion **114** is narrower than first portion **112**. First portion **112** is approximately the width of the tape. Second portion **114** is a narrow neck having end **122** from which button **102** protrudes.

Drive leader **100** includes a plurality of spacing apertures **124a-c**. In a preferred embodiment, spacing

apertures **124a-c** are spaced longitudinally throughout first portion **112** roughly one reel revolution apart from one another. Spacing apertures **124a-c** provide space for button **102** when drive leader **100** is wound around the drive reel. Spacing apertures **124a-c** permit button **102** to be nested into the wound tape without causing tape pack impressions.

Figure 4 is top view of a cartridge leader **400** in accordance with the present invention. **Figure 5** is a perspective view of cartridge leader **400** of **Figure 4** in accordance with the present invention.

Referring to **Figures 4** and **5**, cartridge leader **400** has a first end **402** and a second end **404**. Tape is wound around a cartridge reel (not shown). The tape terminates in a free end that may be used to pull the tape from the cartridge reel. First end **402** is coupled to the free end of the tape. The tape may be pulled from the cartridge reel by pulling cartridge leader **400**, which in turn pulls the free end of the tape, and consequently the rest of the tape from the cartridge reel.

Cartridge leader **400** includes a circular aperture **406** located at second end **404**. Aperture **406** is formed to accept button **102** through aperture **406** when drive leader **100** and cartridge leader **400** are coupled together. Once button **102** is received through aperture **406**, drive leader **100** is pulled away from cartridge leader **400** so as to cause button **102** to move through and then out of aperture **406** and into a locking slit **408** until button reaches an end **410** of slit **408**. When button **102** reaches end **410** of slit **408**, button **102** is locked into place and drive

leader **100** and cartridge leader **400** are connected together.

Slit **408** extends longitudinal along cartridge leader **400** from one side of aperture **408** and terminates at end point **410** which is nearer second end **404**. Spacing aperture **414** is located near first end **402**. Spacing aperture **414** is spaced within cartridge leader **400** so as to receive button **102** when first drive leader **100** and cartridge leader **400** are coupled together and wound around a reel. Spacing aperture **414** permits button **102** to be nested into the wound tape without causing tape pack impressions.

Cartridge leader **400** includes a first flange **416** which extends out from side **418** and second flange **420** which extends out from side **422**. Flanges **416** and **420** are flat in the same plane as leader **400**.

Figure 6 is a perspective view of drive leader **100** of **Figure 1** and cartridge leader **400** of **Figure 4** coupled together in accordance with the present invention. When tape is to be pulled from the cartridge reel and wound onto the drive reel, a drive mechanism (not shown) inserts button **102** into aperture **406**. Drive leader **100** is then pulled away from cartridge leader **400** in order to lock the two leaders together. When drive leader **100** is pulled away from cartridge leader **400**, button **102** moves out of aperture **406** and into locking slit **408**. Button **102** remains above top surface **424** of cartridge leader **400** while neck **114** of drive leader **100** moves underneath end **404** of cartridge leader **400**. In this manner, cartridge leader **400** surrounds base **104** such that sides **426** and **428**

of slit **408** are received within gap **106**. When drive leader **100** and cartridge leader **400** are locked together, end **410** is secured against base **104** with button **102** being located above surface **424** while neck **114** is located below cartridge leader **400**.

Figure 7 is a sectional view of drive leader **100** of **Figure 1** and cartridge leader **400** of **Figure 4** coupled together and wound on a hub **700** that has no recess in accordance with the present invention. Hub **700** has a surface **702** against which three revolutions of drive leader **100** and then two revolutions of cartridge leader **400** are received. Button **102** abuts surface **702** when drive leader **100** and cartridge leader **400** are wound around hub **700**.

Figure 8 is a sectional view of the drive leader of **Figure 1** and the cartridge leader of **Figure 4** coupled together and wound on a hub that has a recess for receiving a protruding button in accordance with the present invention. **Figure 9** is a perspective view of the hub of **Figure 8** that has a recess for receiving a protruding button in accordance with the present invention. Hub **800** has a surface **802** against which three revolutions of drive leader **100** and then two revolutions of cartridge leader **400** are received. Hub **804** also includes a recess **804** for receiving a top portion of button **102** when drive leader **100** and cartridge leader **400** are wound around hub **800**. In this manner, a larger button may be used to lock the drive and cartridge leaders together. A larger button permits a more secure and stable lock between the drive and cartridge leaders.

The present invention provides for a button that protrudes from a leader prior to the leader being coupled to a second leader. A protruding button is a more reliable connection method than the flat T-shaped leaders of the prior art. Further, the present invention button may be nested into spacing apertures and/or a hub recess in order to avoid tape pack impressions.

The present invention button allows for a longer tape path since a threader arm needed for a leader block method is not necessary. Further, the protruding button is lower in cost to manufacture than the treading mechanisms of the prior art.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.